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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/806,552	09/18/2001	Julian I. Schroeder	19452A-000210US	1470

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EXAMINER

COLLINS, CYNTHIA E

ART UNIT	PAPER NUMBER
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1638

DATE MAILED: 01/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/806,552	<b>Applicant(s)</b> SCHROEDER ET AL.	
	<b>Examiner</b> Cynthia Collins	<b>Art Unit</b> 1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 15-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed October 13, 2005 in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 18, 2005 has been entered.

Claims 1-24 are pending.

Claims 15-24 are withdrawn.

Claims 1-14 are examined.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

All previous objections and rejections not set forth below have been withdrawn.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-14 are rejected under 35 U.S.C. 102(a) as being anticipated by McCourt P. et al. (WO 99/06580, published 11 February 1999).

The claims are drawn to a method of inhibiting farnesyltransferase in a plant by introducing into a plant, including by *Agrobacterium*, microparticle bombardment or sexual cross, a recombinant expression cassette comprising a promoter specific for expression in guard cells and a nucleic acid encoding a protein inhibitor of farnesyltransferase, and a plant, plant cell or seed or tissue culture comprising said recombinant expression cassette. The claims are also drawn to said method wherein the inhibitor inhibits the farnesyltransferase alpha-subunit or the farnesyltransferase beta-subunit.

McCourt P. et al. teach a method of inhibiting farnesyltransferase in a plant by introducing into a plant, including by *Agrobacterium*, microparticle bombardment or sexual cross, a recombinant expression cassette comprising a promoter specific for expression in guard cells and a nucleic acid encoding a protein inhibitor of farnesyltransferase, and a plant, plant cell or seed or tissue culture comprising said recombinant expression cassette. (page 20 line 31 to page 21 line 15; page 27 line 1 to page 28 line 15; page 32 line 24 to page 34 line 2). The inhibitor taught by McCourt P. et al. inhibits the farnesyltransferase alpha-subunit and the farnesyltransferase beta-subunit as both the alpha-subunit and the beta-subunit are required for farnesyltransferase catalytic activity (Qian D. et al. Protein farnesyltransferase in plants: molecular characterization and involvement in cell cycle control. Plant Cell. 1996 Dec;8(12):2381-94, page 2381 column 2 1<sup>st</sup> full paragraph).

Art Unit: 1638

Claims 1-14 are rejected under 35 U.S.C. 102(e) as being anticipated by McCourt P. et al. (U.S. Patent Application Publication No. US 2001/0044938 A1, published November 22, 2001, a continuation-in-part of U.S. non-provisional application no. 09/124,867, filed July 30, 1998 claiming priority to U.S. provisional application no. 60/054474, filed August 1, 1997).

The claims are drawn to a method of inhibiting farnesyltransferase in a plant by introducing into a plant, including by *Agrobacterium*, microparticle bombardment or sexual cross, a recombinant expression cassette comprising a promoter specific for expression in guard cells and a nucleic acid encoding a protein inhibitor of farnesyltransferase, and a plant, plant cell or seed or tissue culture comprising said recombinant expression cassette. The claims are also drawn to said method wherein the inhibitor inhibits the farnesyltransferase alpha-subunit or the farnesyltransferase beta-subunit.

McCourt P. et al. teach a method of inhibiting farnesyltransferase in a plant by introducing into a plant, including by *Agrobacterium*, microparticle bombardment or sexual cross, a recombinant expression cassette comprising a promoter specific for expression in guard cells and a nucleic acid encoding a protein inhibitor of farnesyltransferase, and a plant, plant cell or seed or tissue culture comprising said recombinant expression cassette. (page 6 column 1 paragraphs [0055]-[0056]; page 7 column 2 paragraphs [0070]-[073] ; page 9 column 1 paragraphs [0085]-[0089]). The inhibitor taught by McCourt P. et al. inhibits the farnesyltransferase alpha-subunit and the farnesyltransferase beta-subunit as both the alpha-subunit and the beta-subunit are required for farnesyltransferase catalytic activity (Qian D. et al. Protein

Art Unit: 1638

farnesyltransferase in plants: molecular characterization and involvement in cell cycle control. *Plant Cell*. 1996 Dec;8(12):2381-94, page 2381 column 2 1<sup>st</sup> full paragraph).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jaynes J.M. et al. (U.S. Patent No. 5,597,945, issued January 28, 1997) in view of Pei Z.M. et al. (Role of farnesyltransferase in ABA regulation of guard cell anion channels and plant water loss. *Science*. 1998 Oct 9;282(5387):287-90), Nakamura R.L. et al. (Expression of an Arabidopsis potassium channel gene in guard cells. *Plant Physiol*. 1995 Oct;109(2):371-4), Reiss Y. et al. (Inhibition of purified p21ras farnesyl:protein transferase by Cys-AAX tetrapeptides. *Cell*. 1990 Jul 13;62(1):81-8), and Yalovsky S. et al. (Plant farnesyltransferase can restore yeast Ras signaling and mating. *Mol Cell Biol*. 1997 Apr;17(4):1986-94).

The claims are drawn to a method of inhibiting farnesyltransferase in a plant by introducing into a plant, including by *Agrobacterium*, microparticle bombardment or sexual cross, a recombinant expression cassette comprising a promoter specific for expression in guard cells and a nucleic acid encoding a protein inhibitor of farnesyltransferase, and a plant, plant cell or seed or tissue culture comprising said recombinant expression cassette. The claims are also drawn to said method wherein the

Art Unit: 1638

inhibitor inhibits the farnesyltransferase alpha-subunit or the farnesyltransferase beta-subunit.

Jaynes J.M. et al. teach a method of inhibiting microbes in a plant by introducing into a plant, including by *Agrobacterium* or sexual cross, a recombinant expression cassette comprising a promoter and a nucleic acid encoding a peptide protein inhibitor of microbes, and a plant, plant cell or seed or tissue culture comprising said recombinant expression cassette (columns 15-28).

Jaynes J.M. et al. do not teach a method of inhibiting farnesyltransferase in a plant, or microparticle bombardment, or a recombinant expression cassette comprising a promoter specific for expression in guard cells and a nucleic acid encoding a protein inhibitor of farnesyltransferase.

Pei Z.M. et al. teach that the phytohormone abscisic acid (ABA) reduces water loss by triggering stomatal pore closure in leaves, that deletion of the *Arabidopsis* farnesyltransferase gene ERA1, or application of farnesyltransferase inhibitors, results in ABA hypersensitivity of guard cell anion-channel activation and of stomatal closing (abstract; Figs. 1 and 2). Pei Z.M. et al. also teach that ERA1 is expressed in guard cells, and that era1 plants exhibit a reduction in transpirational water loss during drought treatment (abstract; Fig. 1; Fig. 4).

Nakamura R.L. et al. teach a KAT1 promoter specific for expression in guard cells (page 373 Fig. 3).

Reiss Y. et al. teach a rat farnesyl:protein transferase that binds to a hexapeptide containing the consensus sequence (Cys-AAX) for farnesylation (page 83 Table 1). Reiss

Art Unit: 1638

Y. et al. also teach competitive inhibition of the enzyme by defined peptides as short as 4 residues that contained the Cys-AAX motif (page 85 Figs. 9-11).

Yalovsky S. et al. teach that coexpression of tomato plant farnesyltransferase alpha and beta subunits in either yeast or insect cells yields a functional enzyme that correctly farnesylates CaaX-motif-containing peptides (page 1991 Fig. 5). Yalovsky S. et al. also teach that the tomato plant farnesyltransferase and mammalian farnesyltransferases are more closely related to each other than they are to the yeast farnesyltransferase (page 1992 column 2).

It would have been *prima facie* obvious to one skilled in the art at the time the invention was made to inhibit farnesyltransferase in a plant by introducing into a plant a recombinant expression cassette comprising a promoter specific for expression in guard cells and a nucleic acid encoding a protein inhibitor of farnesyltransferase. One skilled in the art would have been motivated to do so in order to increase ABA hypersensitivity of guard cell anion-channel activation and stomatal closing, and reduce transpirational water loss during drought treatment, as taught by Pei Z.M. et al. One skilled in the art would have had a reasonable expectation of success given the teaching of Jaynes J.M. et al. that nucleic acids encoding peptide protein inhibitors can be expressed in plants, the teaching Nakamura R.L. et al. that a KAT1 promoter functions specifically for expression in guard cells, the teaching of Reiss Y. et al. that a mammalian farnesyltransferase that binds peptides containing the CaaX consensus sequence for farnesylation can be competitively inhibited by defined peptides that contain the CaaX consensus sequence, and the teaching of Yalovsky S. et al. that a plant farnesyltransferase also correctly farnesylates CaaX-motif-containing peptides. The use of microparticle bombardment for plant



Art Unit: 1638

transformation would have been an obvious modification of design parameters for one skilled in the art at the time the invention was made. The inhibitor taught by Reiss Y. et al. inhibits the farnesyltransferase alpha-subunit and the farnesyltransferase beta-subunit as both the alpha-subunit and the beta-subunit are required for farnesyltransferase catalytic activity (Qian D. et al. Protein farnesyltransferase in plants: molecular characterization and involvement in cell cycle control. Plant Cell. 1996 Dec;8(12):2381-94, page 2381 column 2 1<sup>st</sup> full paragraph). Accordingly, one skilled in the art would have been motivated to generate the claimed invention with a reasonable expectation of success. Thus, the claimed invention would have been *prima facie* obvious as a whole to one of ordinary skill in the art at the time the invention was made.

#### ***Remarks***

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Collins whose telephone number is (571) 272-0794. The examiner can normally be reached on Monday-Friday 8:45 AM -5:15 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571) 272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1638

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cynthia Collins  
Primary Examiner  
Art Unit 1638

CC

  
1/20/06